

ANALYSIS OF MOBILE PAYMENT INFLUENCING FACTORS

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ABSTRACT

With the exponential proliferation of mobile devices in the consumer market, wireless e-business is emerging as a key area to revolutionise industries. In the past few years, industry has witnessed an increase in the adoption of mobile payment and billing methods that leverage on wireless technologies. Yet, the success of mobile payments in businesses much depends on many factors such as, type of wireless technologies used, security options available, the players involved and their influencing m-business models. This paper examines mobile payments in both technical as well as business perspectives. It identifies and analyses the influencing factors from multi-dimensions that would be useful for adopting mobile payments.

KEYWORDS

Mobile payments, Wireless technologies, Business models. M-commerce

1. INTRODUCTION

Wireless e-business termed as m-commerce has the main advantage of portability with ubiquitous business transactions that can be performed anywhere and anytime [1]. In addition to the key mobile features of location-based and personalised information services, payments embedded in mobile apps or websites provide value-added facility that aid in the business agility of organisations in this competitive business environment [2][3]. With recent developments in wireless communication technologies using 3G evolved to 4G networks, mobile Internet and multimedia streaming have gained popularity and provide increased channels of interaction with customers [4][5]. Hence, organisations expect that m-commerce provides a cost-effective improvement in their operational efficiency, resulting in an increase in profitability. Businesses have started to consider mobile payments as value-added services providing opportunities for their marketing, promotion and branding [6][7].

Apart from business perspectives, looking at consumer trend in the last decade, most consumers have been using mobile phones beyond the traditional services of voice calls and SMS. By the end of 2016, two thirds of the world's population acquired a mobile subscription with a surge in mobile broadband adoption via smart phones [8]. Mobile devices now account for 60% of the connections with new services and dedicated apps leveraging on mobile internet that could make common man's daily activities quite convenient. Hence, consumers' expectations from these smart devices have risen dramatically and mobile payment services are now being recognised to be important. Many consumers from countries such as, Finland, UK, North America, Japan, Korea and Singapore started to adopt mobile payments more than a decade back [9][10] as their preferred mode of cashless transactions in their everyday lives - while transacting with vending

machines, online ticketing agencies, public transport systems and merchant stores. A recent survey in UK indicates that 56% of smart phone owners purchased a product using a mobile app transaction in 2015 and mobile banking transactions via apps have now been envisaged by consumers [11]. However, global reports indicate that mobile revenue growth is slow [8][12]. There is lack of research in analysing this situation from current technological and business perspectives and such investigations could have a positive influence on mobile payment adoption [7][13]. This provides the key motivation for the study reported here.

This paper is aimed at providing an analysis of the trends in mobile payments, from technology, business, as well as consumer perspectives for analysing the influencing factors. The remainder of the paper is organised as follows. Section 2 describes the need for the study. The influencing factors from various facets of mobile payments are identified and analysed in section 3. Finally, concluding remarks are provided in section 4.

2. THE NEED FOR THE STUDY

Despite potential advantages of m-commerce], mobile payments face major challenges as financial transactions via mobile devices demands a multi-faceted approach involving technology innovations, apps and service offerings as well as global business trends [14][15]. In addition, with the emergence of player-centric mobile payment services, new mobile payment business models are being introduced [16]. Both remote and proximity type of mobile payment systems have witnessed evolution of technologies such as Infrared (IR) and Bluetooth combined with services such as Interactive Voice Response (IVR), Short Message Service (SMS), Radio Frequency Identification (RFID)/2D bar codes, Wireless application Protocol (WAP), contactless interface to chip-enabled payment technology, Near-Field Communication (NFC) enabled mobile phones, contactless stickers, tags, mobile browsers, mobile apps and m-wallets [5][17].

With the existing plethora of wireless technologies, both merchants and consumers are clouded with a range of options available to them for adopting mobile payments and are not sure if they are taking the road to success or failure [4][7]. In the past decade, mobile payments were used for predominantly non-banking transactions with several failed initiatives such as Dencoin and Google Wallet even in developed countries [18][19].

On one hand, the banking sector is gradually embracing digital payments capitalising on the IT players such as Apple and Google to compete in the market that may shape its future [12]. On the other hand, the success or failure of mobile payments is based on the consumer acceptance [13]. Recent studies conducted worldwide indicate that mobile payment growth has been slower than anticipated [8][12]. This is because, mobile payments are not just a new technology added on to existing consumer networks, but actually have their own set of historical and normative roots in development practices with an emphasis to be given on market subjects and consumer subjects [7]. Previous studies have predominantly focussed on the technology and payment options available to a consumer based on factors such as location (remote/proximity), payment value (micro/macro amount), and charging method (post-paid/pre-paid), and the associated security protocols [20][21][22]. There is lack of literature that analyses the current multi-faceted dimensions of mobile payments [23][24][25]. There is little guidance available for merchants and consumers to review the various mobile payment options and to adopt those mobile payment methods that suit their requirements.

Due to the paucity of research in this area, this paper analyses various influencing factors for adopting mobile payments. This would help businesses and consumers to make a more systematic review before they embark on the right kind of mobile payments that would add value to their everyday activities. This paper takes a modest step in this direction.

3. INFLUENCING FACTORS FOR MOBILE PAYMENTS

Although some industries such as, retail, entertainment and banking have been successfully adopting mobile options for billing and payment in certain countries, many industries are still cautious in offering mobile payment methods for their customers. This is partly because there are several issues related to mobile payments in an enterprise. On analysing the influencing factors, these could be broadly classified under three main dimensions:

- mobile payment players,
- payment methods and
- enabling wireless technologies

Mobile Payment Players

There are many parties or players contributing to the mobile payment value chain. In order to access a payment service, a user or subscriber initially has to come into an agreement with a network provider for accessing telecommunication and the payment services provided by the specific operator. If mobile internet is used, an additional contract between a subscriber and an ISP is required. However, with the introduction of 3G/4G technologies, mobile internet could be accessed directly through their mobile operator. Recent evolutions have enabled users to adopt new mobile payment and billing models for accessing various networks and services independent of the network provider [5][26]. In Table 1, we have summarised a list of players involved in influencing mobile payments in businesses.

Table 1. Mobile Payment Players and Influencing Factors

<i>Mobile Payment Players</i>	<i>Influencing Factors</i>
Equipment / device manufacturers	Device usability, features & constraints, Wireless technology, Native software, use of third party H/W and S/W
Network service providers	Telecommunication infrastructure, Billing models and contracts, Integration with payment service providers, QoS, Network interoperability and Security
Financial service providers	Types of e-cash systems, Credit systems, Security and Payment settlement
Payment service providers	Interfacing (S/W, H/W and other players), Security and Cost
Market regulators and consortiums	Governing laws (bank, government and other agencies), Rights protection, Price regulations and Tax policies

The abovementioned players need not be exactly mapped onto various business parties but could be an aggregation of business entities. For instance, the network service provider could be aggregating the services of mobile network operators, content providers and Internet service providers. Alternatively, there are cases where the network operator covers the functionality of an Internet service provider, while the content provider caters to payment services as well. Proprietary mobile payment solutions are now being introduced as issuer wallets to compete with device manufacturers such as Apple, Samsung, etc. Hence, an evolution of such industry players have a major influence on the consumer adoption of mobile payments.

Payment Methods

Though mobile payment services were traditionally managed by mobile network operators for many years using player-centric models, recently we find the emergence of new payment and billing models that allow consumers to access the payment services independent of who the

owner of the service is [13][27]. The issue of mobile payment adoption is further compounded by the types of payment methods supported here. Commonly used payment methods include pre-paid cash card, micro-billing, person-to-person (P2P) and credit card payments. Some of the main factors that influence these payment methods in m-commerce are identified in Table 2.

Table 2. Payment Methods and Influencing Factors

<i>Payment Methods</i>	<i>Influencing Factors</i>
Pre-paid cash card	Small transaction amount, Top-up methods and Availability to anyone
Micro-billing	Billing options, Service charge and Transaction maintenance
Person-to-person (P2P)	Direct credit or debit options, Service charge, Account maintenance and Security
Credit card	Service provider trust, M-wallets (H/W and S/W integration) and Security

Similar to Internet-based online payment methods that support pre-paid (debit) and post-paid (credit) services, mobile payments require an integrated flexible model that support quality of service (QoS) with one-stop billing schemes for the end-users [21].

Enabling Wireless Technologies

The aforesaid payment methods could be adopted to make mobile payment transactions using different wireless technologies. Such mobile payments go through a set of wireless security levels which is a key factor in providing consumer trust and confidence [28]. The enabling wireless technologies could support mobile security elements that are either removable or non-removable from the mobile device [24]. Removable security elements could be a single chip, a dual chip or a dual slot, while non-removable security elements could support embedded hardware and software modules, including personalised biometric technologies [13]. In table 3, we identify a list of wireless technologies commonly adopted in businesses and their influencing factors for mobile payment adoption.

Table 3. Enabling Wireless Technologies and Influencing Factors

<i>Enabling Wireless Technologies</i>	<i>Influencing Factors</i>
Radio Frequency Identification (RFID)	Transponder & reader frequencies / range, Encryption methods and Payment methods
Short Message Service (SMS)	SMS gateway QoS, Payment methods, Merchant port ID and Push technology
Wireless Access Protocol (WAP) using WIM chip	Dual chip phones, WIM certificate, Payment methods, Security and Account Maintenance
Infrared (IR)	Point-to-point range, Fault-tolerance and Payment methods
Bluetooth	Security, Transmission time and Data volume
Near Field Communication (NFC)	Tokenisation, Mobile phones, NFC reader, Payment methods
Internet	Mobile Apps for Payments, M-wallets, Security, Payment Methods, Account Maintenance & Fees

A mobile payment system typically espouses several wireless technologies with different possible payment methods and with different player-centric influencing factors. With security being a major concern in mobile payments, security modules with digital signatures are being implemented in the form of WAP Identity Module (WIM) cards. From traditional, simple Interactive Voice Response (IVR) systems adopted in phone banking to enhanced WIM chips in mobile devices and now with sophisticated mobile apps, the use of different wireless technologies

involves different levels of security as the device moves in and out of multiple wireless networks leading to many security issues [17].

4. CONCLUSIONS

The adoption of mobile payment is constricted by multi-faceted issues that can be approached from several angles. This paper identified three main dimensions such as mobile payment players, payment methods and enabled wireless technologies. An analysis resulted in their influencing factors for a successful mobile payment adoption. These influencing factors would facilitate consumers, businesses and researchers to consider the different mobile payment solutions, from technology as well as business perspectives for decision making.

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